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## **Foreign capital, Non-Traded Goods and Welfare in a Developing Economy in the presence of Externalities<sup>♦</sup>**

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**Abstract:** A three-sector, three-factor general equilibrium model is developed for a small open developing economy where an inflow of foreign capital generates externalities in the presence of a non-traded final commodity. There are two types of capital and the efficiency of labour depends positively on the consumption of the non-traded commodity. Effects of inflows of foreign capital on social welfare and human capital formation are examined. The analysis finds that while capital that is used in all the sectors may improve welfare; capital used specifically in the non-traded sector is likely to affect social welfare adversely. These results can at least question the desirability of allowing entry of foreign capital in the non-traded final good sector that emanates externalities.

**Keywords:** Foreign capital, externality, non-traded good, social welfare, human capital formation, general equilibrium.

**JEL Classification:** F18, O17, O33, Q56.

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## **Foreign capital, Non-Traded Goods and Welfare in a Developing Economy in the presence of Externalities**

### **1. Introduction**

In a two-commodity, two-factor full-employment setting for a small open economy, an inflow of foreign capital with complete repatriation of foreign capital income does not change social welfare. However, in the presence of a tariff the result is different. Brecher and Alejandro (1977) have found that inflows of foreign capital are necessarily immiserizing if the import-competing sector is capital-intensive and is protected by a tariff. Here welfare is defined as a positive function of national income. An inflow of foreign capital leads to an expansion of the capital intensive import-competing sector thereby cutting back the volume of trade further for a small open economy and moves it further away from the free trade situation, which is the optimal policy. In the literature, the Brecher-Alejandro proposition has also been re-examined in terms of three-sector full-employment models like Beladi and Marjit (1992a, 1992b) with the third sector being a duty-free zone.

As the developing countries are plagued by economic dualism of different types, factor market distortions and structural rigidities, some attempts have been made to analyze the welfare impact of foreign capital inflow using a Harris-Todaro (1970) framework<sup>1</sup>. For example, Khan (1982) has considered a mobile capital Harris-Todaro (HT) model with urban unemployment. A third sector, called an urban informal sector, which absorbs the unemployed urban workers at a low and competitive wage rate, has been introduced in the works of Grinols (1991), Chandra and Khan (1993) and Gupta (1997). The immiserizing result of foreign capital in the

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<sup>1</sup> The introduction of labour market distortion in the form of unionized wage in the urban formal sector in an HT structure can in no way affect the welfare result relating to foreign capital due to a special property, called 'envelope property', implied by this framework. In an HT framework, the average wage of labour in the economy is equal to the rural sector wage. Once the rural sector wage remains unchanged, there is no labour reallocation effect on welfare due to foreign capital inflow, and therefore, results are similar to those obtained in a full-employment framework.

presence of a tariff protected import competing sector has been found to be valid in general<sup>2</sup> despite the presence of an additional sector.

Many economists have now successfully been able to show that foreign capital might be welfare improving in the developing economies in several cases. The works like Marjit and Beladi (1996), Chaudhuri (2005, 2007) and Chaudhuri et al. (2006) have demonstrated how foreign capital might produce favourable effects on welfare taking into consideration some essential features of the developing economies e.g. existence of labour market distortion, presence of the vast informal economy and non-traded goods. In particular, as found in the works of Marjit and Beladi (1996) and Chaudhuri (2001a), if foreign capital is allowed to enter an intermediate good (internationally traded or non-traded) sector only, it may be welfare-improving. Besides, Chaudhuri (2005) has shown that even in a 2×2 full-employment structure with tariff and labour market distortions, an inflow of foreign capital may be welfare-improving. Also Chaudhuri (2007) has found that in an HT structure with agricultural dualism and a non-traded final commodity, it is possible to show that an inflow of foreign capital might improve social welfare.

A foreign direct investment (FDI) is often accompanied by transfer of superior technologies of production that raises the productivity of the workers in the capital-receiving countries through externalities. There exists a large theoretical literature dealing with such aspects.<sup>3</sup> However, this literature has paid very little attention to analyzing the consequence of such an FDI-induced technology transfer on the welfare of the developing countries using the simple general equilibrium structure. Notable exceptions are, however, Chaudhuri (2001b, 2005) where an inflow of foreign capital is accompanied by transfer of technology that raises the efficiency of labour and hence the effective labour force in efficiency unit. In the former work social welfare worsens following an expansion of the tariff-protected, import-competing sector while in the latter welfare is likely to improve owing to an increase in aggregate wage

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<sup>2</sup> Grinols (1991) is, of course, a notable exception.

<sup>3</sup> See for example, Markusen (1995, 2002), Norback and Persson (2002), Neary (2002, 2003), Markusen and Venables (1999), Mattoo et al. (2004), Blalock and Gertler (2008) etc.

income although the protected sector expands. However, externalities due to an FDI may well occur through changes in intersectoral composition of output even in the absence of any technology transfer. The present paper purports to analyze such a case where an FDI may expand a non-traded sector that produces a final good (services) whose consumption directly raises the efficiency of the workers. A three-sector, three-factor general equilibrium model has been developed. There are two types of capital, of which capital of type  $K$  is used in all the three sectors of the economy and capital of type  $N$  is specific to the non-traded sector. The possibility of welfare improvement through an FDI has been explored in the backdrop of a developing economy where there are tariff and labour market distortions.

The results of the analysis indicate that an FDI of capital of type  $N$  although raises the human capital endowment of the economy, may adversely affect social welfare under reasonable conditions. On the contrary, an inflow of foreign capital of type  $K$  is likely to be welfare-improving. Although these effects crucially hinge on different structural factors e.g. the degree of labour market imperfection, trade-related and technological factors, they can at least question the desirability of allowing entry of foreign capital in the non-traded final good sector that generates externalities. As the parameters of the model on which the results crucially depend are amenable to policy measures these have important policy implications for overpopulated developing countries with preponderance of factor market and product market distortions and a large non-traded final good (services) sector like healthcare.

## 2. The Model

We consider a small open developing economy consisting of three sectors: sector 1, sector 2 and sector  $G$ . Sector 1 produces an agricultural commodity ( $X_1$ ) with labour ( $L$ ) and capital of type  $K$ . Sector 2 uses labour and capital of type  $K$  to produce a manufacturing commodity ( $X_2$ ). Finally, sector  $G$  is a non-traded sector that uses labour and two types of capital,  $K$  and  $N$ , to produce a final commodity (services),  $X_G$ . It is assumed that sector 1 is the export sector, sector 2 is the import-competing sector and sector  $G$  is the producer of a non-traded final good (services) which is consumed domestically. The import-competing sector (sector 2) is protected

by an import tariff.<sup>4</sup> Workers in the agricultural sector earn the competitive wage,  $W$ , while the wage rate in the manufacturing sector and the non-traded sector is  $W^*$ , which is institutionally determined, and  $W^* > W$ . So we have labour market distortions.<sup>5</sup> Due to the assumption of a small open economy, prices of commodities 1 and 2 are internationally given. Since commodity (services)  $G$  is internationally non-traded, its price is determined domestically by demand and supply forces. While labour is imperfectly mobile, capital of type  $K$  is perfectly mobile between all the sectors of the economy. Capital of type  $N$  is specific to sector  $G$  and is entirely owned by foreign capitalists<sup>6</sup> so that the return from it is fully repatriated. The endowments of the three primary inputs in the economy are  $L, K$  and  $N$ , respectively. All the factors of production are fully employed. Production functions in sectors 1 and 2 exhibit constant returns to scale with diminishing marginal productivity to each factor. In sector  $G$  we have fixed-coefficient technology.<sup>7</sup> Finally, commodity 1 is assumed to be the numeraire so that  $P_1 = 1$ .

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<sup>4</sup> It is a well-known trade-theoretic result that in a small open economy the optimal tariff is zero. However, the government in a developing economy like India finds no alternative but to keep some tariffs on importables owing to political pressures keeping in view the employment preserving effects of tariffs. Furthermore, in a developing economy with multiple distortions the effect(s) of any parametric changes on social welfare might change enormously compared to the one distortion case. This is because the effects of different distortions might move in the two opposite directions nullifying each other's effects. Hence the net welfare effect depends on the relative magnitudes of different effects.

<sup>5</sup> An employment subsidy in the form of a wage subsidy by the same rate in the two unionized sectors is not advisable in the present context because of the following reasons. It lowers the effective wage cost of labour in the two unionized sectors and raises the return to capital of type  $K$  i.e.  $r$  (see Equation 2). This lowers the competitive wage,  $W$  (see Equation 1) of the common workers. In a large democratic developing country like India, the implementation of this policy would be vehemently opposed by political parties on the ground that it would increase poverty and income inequality.

<sup>6</sup> This is only a simplifying assumption. It may be intuitively checked that the qualitative results of the model remain unaltered even if the stock of capital of type  $N$  consists of both domestic and foreign capital, which are perfect substitutes.

<sup>7</sup> The use of fixed-coefficient technology in the non-traded sector (sector  $G$ ) makes focusing on the externality sharper and easily tractable. I am thankful to the anonymous referee for giving this helpful suggestion.

The general equilibrium is represented by the following set of equations.

$$Wa_{L1} + ra_{K1} = 1 \quad (1)$$

$$W^* a_{L2} + ra_{K2} = P_2(1+t) = P_2^* \quad (2)$$

$$W^* a_{LG} + ra_{KG} + Ra_{NG} = P_G \quad (3)$$

Here,  $a_{ji}$  is the amount of the  $j$  th input required to produce one unit output of the  $i$  th sector for,  $i = 1, 2, G$ ; and,  $j = L, K, N$ . Besides,  $r$  and  $R$  are the returns to capital of type  $K$  and capital of type  $N$ , respectively.  $t$  is the ad-valorem tariff rate on the import of good 2.  $P_2^*(=P_2(1+t))$  is the effective or tariff-inclusive price of commodity 2. Finally,  $P_G$  is the price of the non-traded good (services),  $G$ , which is domestically determined.

Equations (1) – (3) are the competitive industry equilibrium conditions in the three sectors.

The average efficiency of the workers,  $h$ , is considered to be a positive function of the total amount of production (and hence consumption) of commodity,  $G$  <sup>8</sup> and is given by

$$h = h(X_G); h' > 0 \quad (4)$$

Hence the labour endowment in efficiency unit is given by

$$a_{L1}X_1 + a_{L2}X_2 + a_{LG}X_G = h(X_G) \quad (5)$$

where  $a_{Li}X_i$  is the employment of labour (in efficiency unit) in the  $i$  th sector of the economy for  $i = 1, 2, G$ .

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<sup>8</sup> This is easily comprehensible if we call sector G, healthcare. It is assumed that the average efficiency of the workers depends on their health conditions. This is particularly true in the developing countries, where dearth of adequate medical facilities and infrastructure impinges severely on the health of workers, leading to deterioration in their efficiency or productivity. Therefore, an expansion in the healthcare sector is expected to raise their efficiency.

It should be pointed out at this stage that sector  $G$  uses  $a_{LG}X_G$  efficiency units of labour apart from two types of capital in its production to produce  $X_G$  units of commodity  $G$ . The production of commodity  $G$ , which is fully consumed by workers (domestic consumers), raises the average efficiency of the workers through creation of externalities. If  $X_G$  rises by one per cent, sector  $G$  employs  $\lambda_{LG}$  per cent of the labour force additionally while it raises the labour force in efficiency unit by  $\varepsilon_G$  per cent in the margin, where  $\varepsilon_G = \left(\frac{dh(\cdot)}{dX_G} \cdot \frac{X_G}{h(\cdot)}\right) > 0$  is the elasticity of the labour efficiency function,  $h(X_G)$ , with respect to  $X_G$ . It is sensible to assume that sector  $G$  (say, healthcare) is a net supplier of labour input in efficiency unit which implies that  $\lambda_{LG} < \varepsilon_G$ .

Complete utilization of capital of type  $K$  and capital of type  $N$  can be expressed respectively as follows.

$$a_{K1}X_1 + a_{K2}X_2 + a_{KG}X_G = K_D + K_F = K \quad (6)$$

$$a_{NG}X_G = N \quad (7)$$

where  $K_D$  and  $K_F$  are domestic and foreign components of endowment of capital of type  $K$ .  $K_D$  and  $K_F$  are perfect substitutes.  $N$  denotes the stock of capital of type  $N$  which is completely owned by foreign capitalists.<sup>9</sup> Foreign capital incomes of both types are fully repatriated.

Since the consumption of the non-traded final good (services) creates externalities its free market provision is not optimal and therefore, there should be a consumption subsidy from the perspective of social welfare. The consumers receive a subsidy on the consumption of commodity  $G$  at the ad-valorem rate,  $s$ . So the effective price of commodity  $G$  that the consumers face is  $P_G^* = P_G(1 - s)$ . This subsidy is financed by a

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<sup>9</sup> This is only a simplifying assumption. It may be intuitively checked that the qualitative results of the model remain unaltered even if the stock of capital of type  $N$  consists of both domestic and foreign capital, which are perfect substitutes.

portion of the tariff revenue earned by the government from the import of commodity 2.<sup>10</sup>

Let  $D_i$  denote the aggregate demand for the  $i$ th commodity by the consumers for  $i=1,2,G$ . The aggregate demand function for the non-traded final commodity (services) is given by

$$D_G = D_G(P_G^*, Y) \quad (8)$$

(-) (+)

This implies that the demand for commodity  $G$  has the usual own price and income effects.

The consumption subsidy on commodity  $G$ , denoted,  $z$ , is financed by a portion of the tariff revenue earned by the government from the import of commodity 2 and is given by

$$sP_G D_G = z \quad (9)$$

The demand function for the import commodity, denoted  $D_2$ , is given by

$$D_2 = D_2(P_2^*, Y) \quad (10)$$

(-) (+)

All commodities are normal with negative and positive own price and income elasticities of demand, respectively. Commodity  $G$  is a necessary good having a low own price elasticity of demand (in absolute terms). It does not depend on the relative price of commodity 2,  $P_2^*$ , so that the cross-price elasticity is zero. We make the simplifying assumption that the levels of demand for the other two commodities do

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<sup>10</sup> In the standard trade theory, it is usually assumed that the government collects the tariff revenue from the import of the importables (commodity 2 in the present case) and pays it back to the consumers in a lump-sum manner. In this case, from the aggregate tariff revenue the government holds back  $z$  amount (exogenously fixed) for financing the consumption subsidy and the rest is transferred to the consumers in a non-distortionary fashion.

not depend on the relative price of commodity  $G$  i.e.  $(\frac{\partial D_1}{\partial P_G^*}), (\frac{\partial D_2}{\partial P_G^*}) = 0$ .<sup>11</sup>

Commodities 1 and 2 are, however, gross substitutes implying  $(\frac{\partial D_1}{\partial P_2^*}) > 0$ .

The national income at domestic prices, denoted  $Y$ , is given by

$$Y = X_1 + P_2^* X_2 + P_G X_G + tP_2(D_2 - X_2) - rK_F - RN - z \quad (11)$$

where  $[tP_2(D_2 - X_2) - z]$  is the tariff revenue net of the subsidy on consumption of good  $G$  which is transferred to the consumers in a lump-sum fashion. All foreign capital incomes are completely repatriated.

Since commodity (services)  $G$  is consumed domestically, its supply is circumscribed by its demand. Therefore, in equilibrium, we have

$$D_G = X_G \quad (12)$$

In this model there are three types of distortion namely, commodity market distortion in the form of an import tariff on sector 2, labour market distortion in the form of exogenously given unionized wage in sector 2 and sector  $G$  and the presence of a non-traded final good (services), the consumption of which creates externalities. Since the consumption of the non-traded final good (services) creates externalities there is a consumption subsidy from the perspective of social welfare. If there were only labour market distortion or tariff distortion, economic liberalization policies like labour market reform or trade reform would have been the right approach to remove distortion and improve social welfare. Other distortions are not easy to be removed completely for many reasons. Political intervention is one of the most important reasons.<sup>12</sup>

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<sup>11</sup> It may be verified that even if the levels of demand for the other two commodities depend positively on  $P_G^*$ , implying commodities to be gross substitutes, all the results of the model continue to hold under an additional sufficient condition involving the term,  $(\frac{\partial D_2}{\partial P_G^*})$ .

<sup>12</sup> Although the developing economies have chosen free trade as their development strategy and been implementing liberalized economic policies for the last two decades or so they are yet to proceed a long way in liberalizing their economies sufficiently as desired by the international institutions like the IMF and the World Bank. In a developing country like India,

There are twelve endogenous variables,  $W, r, R, P_G, s, h, X_1, X_2, X_G, D_G, D_2$  and  $Y$  that can be solved from the above twelve equations. The solution techniques of the endogenous variables are as follows.  $r$  is obtained from equation (1) as  $W^*$  is exogenously given. Plugging the value of  $r$  in equation (1),  $W$  is found. Equation (3) determines  $R$  as function of  $P_G$ . Then  $X_G$  is solved from equation (7) as function of  $P_G$ . Plugging of  $X_G$  in equations ((5) and (6)) and solving yield the values of  $X_1$  and  $X_2$  again as functions of  $P_G$ . Substituting  $D_2$  from equation (10) in equation (11)  $Y$  is also obtained as function of  $P_G$ . Inserting  $Y$  in equation (10)  $D_2$  is found. Also, substituting  $Y$  in equation (8) one can find  $D_G$  as functions of  $s$  and  $P_G$ . Then from equation (9)  $s$  comes out as function of  $P_G$ . Finally,  $P_G$  is determined from equation (12). Once  $P_G$  is known, the values of the other variables are also known. This is an indecomposable system. Although  $W$  and  $r$  are obtained from the price system alone,  $R$  cannot be solved from the price system alone. Therefore, any changes in factor endowments affect  $R$ .  $\square$ <sup>13</sup>

The demand side of the model is represented by a strictly quasi-concave social welfare function. Let  $V$  denote the social welfare that depends on the consumption of output of the three sectors denoted by  $D_1, D_2$  and  $D_G$ , and is depicted as

$$V = V(D_1, D_2, D_G) \quad (13)$$

The balance of trade equilibrium requires that

$$D_1 + P_2 D_2 = X_1 + P_2 X_2 - rK_F - RN \quad (14)$$

or equivalently,

$$D_1 + P_2^* D_2 + P_G^* D_G = X_1 + P_2^* X_2 + P_G X_G + tP_2(D_2 - X_2) - rK_F - RN - z \quad (14.1)$$

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there are still a lot of structural rigidities, technological and economic backwardness and different types of dualism which need to be removed fast for achieving high rate of economic growth and development. However, in many cases in a democratic set-up the political parties stand in the way of implementing reformatory policies at the desired pace.

<sup>13</sup> Any changes in factor endowments cannot affect factor-coefficients in sector 1 and sector 2 as  $W$  and  $r$  do not change. Besides, in sector  $G$  we have fixed-coefficient technology of production. So, all  $a_{ji}$  s do not change due to changes in factor endowments.

The volume of import of good 2, denoted  $M$ , is given by the following equation.

$$M = D_2(P_2^*, Y) - X_2 \quad (15)$$

### 3. Comparative Static Exercises

In the present model where the average efficiency of labour is determined endogenously by the size of sector  $G$  (say, healthcare) an inflow of foreign capital apart from increasing the capital stock of the economy may also affect the effective labour endowment measured in efficiency unit due to externalities. It will affect the output composition, price of the non-traded good and social welfare. In this backdrop we examine the effects of foreign capital of both types on national welfare and the human capital stock of the economy.

The human capital stock, denoted  $C$ , is the total labour endowment of the economy in efficiency unit which is written as follows.

$$C = h(X_G) \quad (16)$$

#### 3.1 *Effects of inflow of capital of type $K$*

In order to examine the effects of an inflow of foreign capital of type  $K$  on social welfare and human capital stock of the economy, it is assumed that  $\hat{K} > 0$ , while all other parameters remain unchanged. Here the '^' symbol suggests proportionate change.

Differentiating equations (3), (5) – (13), (14.1) and (15) the following results can be proved.<sup>14</sup>

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<sup>14</sup> The derivations can be obtained from the author on request.

$$\left. \begin{aligned}
\text{(i)} \quad & \left(\frac{\hat{P}_G}{\hat{K}}\right) > 0 \text{ iff } (W^* - W)a_{L2} > tP_2; \\
\text{(ii)} \quad & \left(\frac{\hat{X}_1}{\hat{K}}\right) < 0 \text{ and } \left(\frac{\hat{X}_2}{\hat{K}}\right) > 0; \\
\text{(iii)} \quad & \left(\frac{\hat{X}_G}{\hat{K}}\right) = 0; \\
\text{(iv)} \quad & \frac{dC}{dK} = 0; \text{ and,} \\
\text{(v)} \quad & \left(\frac{1}{D_1}\right) \frac{dV}{dK} > 0 \text{ iff } (W^* - W)a_{L2} > tP_2;
\end{aligned} \right\} \quad (17)$$

From (17) the following proposition can now be established.

**Proposition 1:** An inflow of foreign capital of type  $K$  leads to an expansion (a contraction) of sector 2 (sector 1) and leaves sector  $G$  unaffected. It raises the producer price of the product of sector  $G$  (say, healthcare) and improves social welfare iff  $(W^* - W)a_{L2} > tP_2$ . The human capital stock of the economy, however, does not change.<sup>15</sup>

From (17) the following corollaries readily follow.

**Corollary 1:** When  $W^* = W$ , that is, there is no labour market distortion,  $\left(\frac{1}{D_1}\right) \frac{dV}{dK} < 0$ .

**Corollary 2:** When  $t = 0$ , that is, there is no tariff restriction,  $\left(\frac{1}{D_1}\right) \frac{dV}{dK} > 0$ .

From **corollary 1** it entails that the presence of any labour market imperfection is a necessity for an inflow of foreign capital of type  $K$  to be welfare improving. On the other hand, from **corollary 2**, it is evident that in the absence of any tariff welfare unambiguously improves.

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<sup>15</sup> If all commodities are gross substitutes we have  $\left(\frac{\partial D_2}{\partial P_G^*}\right) > 0$ . It can be verified that the necessary and sufficient condition under which the results of proposition 1 are obtained does not change.

We can intuitively explain the results presented in proposition 1 and corollaries 1 and 2 in the following fashion. Sectors 1 and 2 together form a Heckscher-Ohlin subsystem (HOSS) since they use the same two inputs. An inflow of capital of type  $K$  leads to a contraction of sector 1 and an expansion of sector 2 following a Rybczynski effect since the latter is more intensive in the use of capital of type  $K$  (with respect to labour) than the former. Sector  $G$  remains unaffected because of the following reasons: (i) production technology of sector  $G$  is of fixed coefficient type; and, (ii) the endowment of capital of type  $N$ , which is specific to sector  $G$ , has not changed. Now, as sector 1 contracts, more labour (in efficiency unit) are now absorbed in the higher wage-paying unionized sector 2. This is the labour reallocation effect (LRE) that raises the aggregate wage income and works positively on social welfare. There is, however, an offsetting effect, which is called the tariff revenue effect (TRE). As sector 2 expands it lowers the volume of import and hence the tariff revenue net of health subsidy, which is transferred to the consumers in a non-distortionary manner, declines. This TRE works negatively on welfare. National welfare increases if and only if LRE is stronger than TRE, i.e.  $(W^* - W)a_{L2} > tP_2$ . We should note that if welfare improves it pushes up the demand for the non-traded final good,  $G$ . Its supply, however, cannot change for reasons already explained earlier. Therefore, the producer price of the good,  $P_G$  (and also the consumer price,  $P_G^*$ ) would adjust upwardly to clear the market for good  $G$ .<sup>16</sup> As  $P_G$  rises the value of domestic production rises. The value of consumption (demand) by all consumers in the economy rises as well. This raises national income and welfare further. Finally, the human capital stock measured in efficiency does not change as sector  $G$  remains unaffected.

In the absence of any labour market distortion, the LRE is zero. Welfare worsens following negative TRE.

On the contrary, in the absence of any tariff restrictions, there is no negative TRE. So welfare improves unequivocally.

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<sup>16</sup> As  $P_G^* = (1-s)P_G$  and  $z = sP_G X_G$  (see equation (9) and equation (12)), it is evident that  $P_G^*$  increases more than  $P_G$ .

### 3.2 Effects of inflow of foreign capital of type $N$

Let us now find out of the consequences of an inflow of foreign capital of type  $N$  which is specific to the non-traded final good sector. In this case, it is assumed that  $\hat{N} > 0$ , with all other parameters remaining unchanged.

Differentiating Equations (3), (5) – (13), (14.1) and (15) once more the following results can be proved.<sup>17</sup>

$$\begin{aligned}
 & \text{(vi)} \left( \frac{\hat{X}_1}{\hat{N}} \right) < 0; \text{ and, } \left( \frac{\hat{X}_2}{\hat{N}} \right) > 0; \\
 & \text{(vii)} \left( \frac{\hat{X}_G}{\hat{N}} \right) = 1 > 0; \\
 & \text{(viii)} \frac{dC}{dN} > 0; \\
 & \text{(ix)} \left( \frac{\hat{P}_G}{\hat{N}} \right) < 0 \text{ if } (W^* - W)a_{L2} \geq tP_2; \text{ and,} \\
 & \text{(x)} \left( \frac{1}{V_1} \right) \frac{dV}{dN} < 0 \text{ if (i) } (W^* - W)a_{L2} \geq tP_2; \text{ and,} \\
 & \qquad \qquad \qquad \text{(ii) } z \geq W^* \varepsilon_h hL.
 \end{aligned}
 \tag{18}$$

These results can be summarized in terms of the following proposition.

**Proposition 2:** An inflow of foreign capital of type  $N$  (specific to the non-traded sector) (a) leads to expansion of both sector  $G$  and sector 1 and a contraction of sector 2; and, (b) an increase in human capital stock. It lowers the producer price of the product (services) of sector  $G$  (say, healthcare) if  $(W^* - W)a_{L2} \geq tP_2$ . National welfare worsens if additionally,  $z \geq W^* \varepsilon_h hL$ .

The following corollary also follows from the set of results as given by (18).

**Corollary 3:** In the absence of any tariff welfare deteriorates following an inflow of foreign capital of type  $N$  if  $z \geq W^* \varepsilon_h hL$ .<sup>18</sup>

<sup>17</sup> The derivations can be obtained from the author on request.

<sup>18</sup> One can easily derive quite a few alternative sufficient conditions for this result to be valid.

Technology in sector  $G$  is of the fixed-coefficient type and capital of type  $N$  is specific to this sector. So, if there occurs an inflow of this type of capital, sector  $G$  expands. The expanding sector  $G$  requires more capital of type  $K$ , which must come from the other two sectors leading to a Rybczynski type effect (RTE). Consequently, sector 2 contracts while sector 1 expands as the former sector is more intensive in the use of capital of type  $K$  vis-à-vis sector 1. As sector 1 that pays a lower wage to its workers compared to the other two sectors, aggregate wage income falls. This is the LRE that works negatively on social welfare. On the other hand, as the tariff-protected import-competing sector (sector 2) contracts the amount of tariff revenue rises via an increase in the volume of imports. The amount of lump-sum transfer (net of consumption subsidy) to the consumers rises. This is the TRE that in this case works favourably on welfare. However, the negative LRE dominates over the positive TRE if  $(W^* - W)a_{L2} \geq tP_2$ . So these two effects taken together tend to lower not only national welfare but also the demand for the non-traded good. On the other hand, as sector  $G$  expands the human capital formation gets a boost taking full advantage of externalities. The increase in the effective labour force creates additional wage income. This we call the labour endowment effect (LEE) that works favourably on welfare. This also raises the demand for the non-traded good and exerts an upward pressure on its price. As the supply of this good has increased it tends to lower the producer price. Therefore, there are two opposite effects on the producer price of the good,  $P_G$ . It can be checked that  $P_G$  falls if  $(W^* - W)a_{L2} \geq tP_2$  and the elasticity of the labour efficiency function,  $\varepsilon_h$ , is not high.<sup>19</sup> Now if  $P_G$  falls the aggregate value of domestic production falls. The aggregate value of consumption (demand) by all consumers in the economy also falls. This we call the demand value effect (DVE) which in the present case works negatively on national welfare. The negative DVE outweighs the positive LEE if  $(W^* - W)a_{L2} \geq tP_2$  and  $z \geq W^* \varepsilon_h hL$ , and worsens social welfare further.<sup>20</sup> Thus, we find that social deteriorates following an inflow of foreign

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<sup>19</sup> Derivations can be obtained from the author on request.

<sup>20</sup> The sufficient condition,  $z \geq W^* \varepsilon_h hL$ , implies that the magnitude of consumption subsidy (decrease in net lump-sum transfer of tariff revenue to consumers) is not less than the additional wage income generated by externalities. However, this is not at all a necessary condition. One can derive quite a few numbers of alternative sufficient conditions for the results to be valid.

capital of type  $N$  under the sufficient conditions as presented in proposition 2. It may, however, be noted that one can easily derive a couple of alternative sufficient conditions which ensure the results to hold.

In the absence of any tariff, there is no positive TRE. There are only negative LRE, negative DVE and positive LEE. The net effect of the last two effects is negative if  $z \geq W * \epsilon_h hL$ . So, national welfare worsens under this sufficient condition.

#### 4. Concluding remarks

The paper has analyzed the welfare consequence of foreign capital in a small open developing economy using a three-sector, three-factor general equilibrium model with tariff and labour market distortions and a non-traded sector. The non-traded sector produces a final good (services) whose consumption directly raises the efficiency of the workers. There are two types of capital, of which capital of type  $K$  is used in all the three sectors of the economy while capital of type  $N$  is specific to the non-traded sector. So an FDI of capital of  $N$  type expands the non-traded sector thereby emanating externalities.

The analysis has found that an FDI of capital of type  $N$  although raises the human capital endowment of the economy, may affect social welfare adversely. This indicates the possibility of a trade-off between twin economic objectives of the government in a developing economy: maintaining high economic growth and improvement in human capital formation. On the contrary, an inflow of foreign capital of type  $K$  is likely to be welfare-improving. Although these effects crucially hinge on different structural factors e.g. the degree of labour market imperfection, trade-related and technological factors, they can at least question the desirability of allowing entry of foreign capital in the non-traded final good sector, especially when it generates externalities. As the parameters of the model on which the results crucially depend are amenable to policy measures these have important policy implications for overpopulated developing countries with preponderance of factor market and product market distortions and a large non-traded final good (services) sector like healthcare.

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